CLIMATE NARRATIVE, November 2019 and as noted

UNITED STATES WEST COAST AND NORTH PACIFIC

Late November 2019 US west coast satellite derived sea surface temperatures SST_N were 15°C to 18°C from northern Mexico to Point Conception, 12° to 14°C from Point Conception to Point Pinos, 10°-12°C from Point Reyes to Point Arena and 8-11°C to the north. Areas of negative SST_N anomalies persisted along the west coast from the Gulf of Tehuantepec to Vancouver Island (16°-50°N). These extended as much as 900 km offshore between 38°-42°N. Lower SST_N water was carried into the Santa Barbara Channel and offshore 30°-34°N. Much of the North Pacific (NP) had neutral to positive SST_N anomaly at the end of November. Positive anomaly was most intense (≤2.5°C) in the Gulf of Alaska and extending in a broad swath southwest from 40°N, 140°W to the Hawaiian Islands (21°N, 158°W). Negative anomaly occurred in the west central NP 20-40°N, 170°W-160°E and intermittently west to Japan and Kamchatka.
https://www.ospo.noaa.gov/Products/ocean/sst/anomaly/
https://coastwatch.pfeg.noaa.gov https://climatereanalyzer.org/wx/DailySummary/#sstanom (current)
https://www.ospo.noaa.gov/Products/ocean/sst/contour/index.html

During late November, negative **sea level height anomaly** (SLA), -15 to -5 cm, occurred along the west coast of North America and was common in a band reaching across the NP and extending northward along the western Pacific boundary. Positive SLH anomaly (≤ 20 cm) increased in height and spatial extent between 25°-40°N from180° E/W northwest to the coast of northern Japan.
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif

Eight-day composite **satellite imagery** of the US west coast for late November showed coastal bands of **chlorophyll-**a (chl-a) extending 200-500 km offshore from Southern CA to the Gulf of Alaska in concentrations of 0.2- 2.0 mg/m^3. Filaments of these concentrations extended to 900 km west of Northern California at 37°-39°N. North of 50°N, these concentrations, usually less than 1 mg/m^3, reached across the NP to the western NP boundary. Higher concentrations, generally less than 4 mg/m^3, were seen within 50-150 km of shore. South of 33.5°N, oceanic water (≤ 0.2 mg/m^3) occurred within 100 km of shore. Farther offshore, chl-a concentrations between 0.01 and 0.2 mg/m^3 were typical of the temperate North Pacific south of 35°N.
https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html (current)
https://coastwatch.pfeg.noaa.gov/coastwatch/CWBrowserWW180.jsp#
https://www.star.nesdis.noaa.gov/sod/mecb/color/ (current and animations)
https://coastwatch.pfeg.noaa.gov/erddap/griddap/erdVHNchla8day.graph?chla[(last)][(0.0)][(83.65125):(-0.10875)][(-180.03375):(110.00625)]&.draw=surface&.vars=longitude%7Clatitude%7Cchla&.colorBar=%7C%7C%7C%7C%7C&.bgColor=0xffccccff (current)

Nearshore and Tide Station water temperature List for November

Nearshore water temperature locations are given in decreasing latitude. Entries have a station or buoy abbreviation at the start of each line. Temperature values are in brackets with the average of available monthly values first (followed by the range) in parens. Averages for the (first, second and third) 10-day periods, respectively, are within the second parens, followed by the multiyear monthly average, where available.

Amphitrite Point, BC 48.9°N

48.5°N Neah [9.5(8.2-11.4) (9.4,10.1,8.9) 10.3°C]

Cape Flattery WA (48.4°N)

48.4°N NeBy [8.9(6.4-9.9) (8.7,9.4,8.5)°C]

Cape Elizabeth (47.4°N)

47.4°N CpEz, [11.2(9.4-12.3) (11.5,11.8,10.5) 11.1°C]

46°N TlMk [12.8(11.8-13.3) (12.7,13.012.6) 12.3°C]

Cape Blanco (42.8°N)

42.7°N PrtO [10.2(8.8-11.5) (9.8,10.0,9.8)°C]
41.7°N CCty (10.6(8.9-11.6) (10.8,11.1,9.8)°C]
40.7°N EelR [11.6(9.9-13.1) (12.1,11.8,11.0) 12.0°C]

Point Arena (38.9N°)

38.9°N ArCv [11.0(9.6-12.6) (11.1,11.6,10.5)°C]

Point Reyes (38°N)

37.8°N) SFrn [12.4(11.4-13.2) (12.4,12.7,12.0) 12.6]

36.6°N Mtry [14.2(12.5-15.2) (14.5,14.6,13.6)°C]
35.1°N PrtS [15.2(13.2-16.6) (15.4,15.7,14.4)°C]

Point Conception (34.4°)

34.5°N PtCn [15.9(14.2-18.1) (16.3,15.6,15.6)°C]
34.3°N SBCh [17.2(15.8-18.3) (17.4,17.4,16.8) 15.7°C]
34°N Smca [17.5(15.4-18.7) (17.9,17.9,16.7)°C]

32.9°N Try [17.4(15.4-18.4) (17.8,17.9,16.6)°C]
32.9°N LaJo [17.4 (16.0-19.1) (17.9,17.4,16.9)°C

Point Loma (32.7°)

Measurements at a fixed depth below the lowest tide at NOAA **tide stations**, are indicated by: *NeBy* (9443090), *PrtO* (9431647), *CCty* (9419750), *ArCv* (9416841), *Mtry* (9413450), *PrtS* (9412110), *Smca* (9410840), *LaJo* (9410320) in. Numbers lead to detailed location and station descriptions,
https://tidesandcurrents.noaa.gov/stations.html?type=Physical%20Oceanography

Buoy locations, type and other details are obtained from number designations: Neah (46087), CpEz (46041),TlMk (46089),EelR (46022), SFrn (46026), PtCn (46218), SBCh (46053), Try (46225).
https://www.ndbc.noaa.gov/station_page.php?station=46087 Buoy "surface" temperatures are recorded 0.5-1 meter below the level sea surface.

EQUITORIAL AND SOUTH PACIFIC (late November and as noted)

Areas of positive SST_N anomaly (≤2°C) increased across the Equatorial Pacific (EP) during November. Models suggest that El Niño-neutral conditions will persist through the boreal winter and possibly into the spring. Negative SST_N anomaly (≥-1.5°C) persisted east of 100°W. Eastern EP upper 300-meter heat content anomaly

remained positive but weakened through November. Above 200 m depth, positive subsurface temperature anomalies (≤2.5°C) increased between 170°W and 160°E and above 50 m east of 110°W. Negative subsurface temperature anomaly (≥ -1.5°C) occurred in the EP at 150 m between 130°-150°W. Night-time satellite imagery indicated negative (≥-2°C) SST_N anomaly in the south eastern Pacific and in the west north and south of Australia. Positive SST_N anomaly increased in the central South Pacific near 40°S. **Sea level height anomaly** (SLA) was negative (≥ -15 cm) along the eastern Pacific boundary from 25°S to 35°N. This area extended west to 180° E/W at 0°-10°S. Negative SLA occurred in the western south Pacific north and east of Australia. Positive SLA (≤15 cm) occurred at 140°E-180°E/W, 30°S -2°N.
http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/
https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif

The NOAA **Oceanic El Niño Index** (ONI) (3-month running mean of SST anomalies in the Nino 3.4 region) remained near neutral with a 0.3 value including November. http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf https://climatedataguide.ucar.edu/climate-data/multivariate-enso-index (alternate index)

The November 2019 NOAA/NCEI **Pacific Decadal Oscillation Index** (PDO), calculated from ERSST.v4, was neutral (-0.36). PDO and ONI indices are recalculated and may change as data are assimilated into ERSST.v4.
https://www.ncdc.noaa.gov/teleconnections/pdo/ , http://research.jisao.washington.edu/pdo/PDO.latest.txt

The **Pacific / North American Teleconnection Index** (PNA), computed from atmospheric pressure over the Pacific Ocean and North America had near neutral daily values, with a November mean value of -0.03. https://www.cpc.ncep.noaa.gov/data/teledoc/pna.shtml (see computational alternaties).

November monthly ERD/SWFSC coastal **Upwelling Indices** (UI) had positive UI anomalies from 33°N northward to the Gulf of Alaska (60°N). Weakly positive UI, favorable to upwelling, were computed from 27° to 42°N.
https://upwell.pfeg.noaa.gov/products/PFELData/upwell/monthly/table.1911 Daily UI calculations indicate favorable upwelling conditions at 39°N on 19-20 and 24-25 November.
https://oceanwatch.pfeg.noaa.gov/products/PFELData/upwell/daily/p09dayac.all

PRECIPITATION and RUNOFF (late November)

Seasonal precipitation remained below normal in northern California, Oregon, Washington, and southern Canada. This is becoming apparent in streamflow (see below) and snowpack that was less than 25% in several northwestern river basins. Late November rain in CA brought seasonal precipitation to normal levels in the south. https://droughtmonitor.unl.edu. **Fraser River** discharge, measured at Hope (130 km upriver from Vancouver, B.C.), was 1,750 m^3/s (61,793 cubic feet /sec or cfs) in late November. The multi-year median for late November at Hope is 1,350 m^3/s. https://wateroffice.ec.gc.ca The **Puyallup River** at Puyallup, WA was flowing at 1,290 cfs [3,170 -historical median as cfs in brackets]. **Skagit River** flow was 8,550 [16,900 cfs] near Mount Vernon. **Stillaguamish River** discharge was 571 [2,440 cfs] at Arlington. **Columbia River** transport at the Dalles was 137,000 [116,000 cfs] and 139,000 [134,000 cfs] at Vancouver WA. At Elkton, OR, **Umpqua River** transport was 1,380 [1,620 cfs]. **Rogue River** flow was 1,459 [2,210 cfs] at Grants Pass and 2,090 [4,820 cfs] at Agness. The

Klamath River near Klamath, CA was transporting 3,790 [12,500 cfs]. **Smith River** discharge was 760 [4,190 cfs] near Crescent City. The **Eel River** at Scotia had 644 [3,660 cfs] transport. At the **Battle Creek,** Coleman National Fish Hatchery, the flow was 529 [341 cfs]. **Butte Creek** at Chico had 448 [162 cfs] transport. **Sacramento River** transport was 14,300 [12,300 cfs] at Verona and 18,400 [14,599 cfs] at Freeport. **San Joaquin River** flow was 2,200 [1,970 cfs] at Vernalis. **Pescadero Creek** transport was 20 [7 cfs] near Pescadero. **San Lorenzo River** discharge was 32.1 [3.4 cfs] at San Lorenzo. The **Pajaro River** at Corralitos was flowing at 45 [39 cfs]. The **Salinas River** near Spreckels was discharging at 5.4 [4.2 cfs]. The **Carmel River** at Carmel was flowing at 118 [47 cfs]. The **Big Sur River** near Big Sur, CA discharged at 91[27 cfs].
https://waterdata.usgs.gov/ca/nwis/current/?type=flow
https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLI.php= (current)
https://wateroffice.ec.gc.ca/search/real_time_results_e.html

Notes

On 13 November the **Oregon** Department of Fish and Wildlife delayed the opening of the OR **commercial Dungeness crab** season from December 1st until at least mid-December because crab quality testing (% of edible flesh) during November showed that none of the tested areas would meet yield criteria by December 1st.
The delayed opening will allow crabs to fill their exoskeletons more completely with firm flesh. Tests for domoic acid found all OR Dungeness samples to be safe for human consumption. Commercial Dungeness crab is Oregon's most valuable fishery, worth $66.7 million last season (2018-2019). Recreational harvest of Dungeness crab opened for the entire OR coast on December 1st. https://www.dfw.state.or.us/news/2019/11_Nov/111319.asp

Understanding **biodiversity**, and how it is changing, is necessary to effectively manage the **Monterey Bay National Marine Sanctuary** (MBNMS), a federal marine protected area located off the central coast of California. To this end, Erica J. Burton, Erica.Burton@noaa.gov, and Robert N. Lea, rnlea@comcast.net, compiled an "Annotated checklist of fishes in Monterey Bay National Marine Sanctuary with notes on extralimital species." This is the first comprehensive annotated checklist of 507 fishes known to occur within the MBNMS. In addition, 18 extralimital species (not historically reported) are described. The checklist and extensive notes are available, https://zookeys.pensoft.net/issue/2798/

State and Federal scientists estimate that almost 3.8 million juvenile **winter-run Chinook salmon headed down the Sacramento River** toward the ocean this year. Typically, more than 50% of the outgoing juveniles have headed downriver by 30 November. This year's total is the most since 2009, when about 5 million juveniles traveled downriver. The rebounding numbers of winter-run Chinook reflect coordinated fish hatchery and water management plans. About 8,000 adult winter-run chinook returned to the Sacramento in 2019, due to more favorable ocean conditions. Since river reproduction by winter-run Chinook salmon was marginal in the 2014 and 2015 drought years, this year's generation of juveniles is especially critical for sustaining the population. https://www.fisheries.noaa.gov/feature-story/endangered-winter-run-chinook-salmon-increase-millions-offspring-headed-sea

This Narrative may be found, https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html
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